

REMARKS

Request for Consideration, Informal Matters, and Claim Status

The Official action of 5 June 2000 has been considered carefully. Reconsideration of the claimed invention in view of the amendments above and discussion
5 below is respectfully requested.

The specification has been reviewed carefully and amended grammatically and idiomatically. New Claims 21-27 have been added for consideration by the Examiner. No new matter has been added.

Claims 1 and 3-27 are pending. Claim 2 has been cancelled.

Allowability of Claims Pending

10 Claims 1-20 stand rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,824,992 (Nagarajan) in view of U.S. Patent No. 5,192,851 (James) and U.S. Patent No. 5,365,036 (Crockett). Official Action, 5 June 2000, para. 2.

15 The present invention relates generally to metal-core weld wires having reduced fume production resulting, in at least some embodiments, from a reduced carbon content in the sheath thereof, and particularly from metal-core weld wire sheaths having not more than approximately 0.008 % C, and in another exemplary embodiment a sheath carbon less than 0.005% C.

20 Reducing the carbon content in the sheath of metal-core weld wires to within the ranges recited in the inventions of amended Claim 1 and new Claim 21, which are discussed below, substantially reduces the amount of fumes generated thereby.

Claim 1 has been amended to recite a metal-core weld wire having, among other limitations, a low carbon steel sheath having "... a carbon content less than 0.005 % C"

5 Nagarajan does not disclose a metal-core weld wire having a sheath with "...
a carbon content less than 0.005 % C ...", as recited in Claim 1. Nagarajan discloses "low
carbon" and "low alloy" metal-core weld wires having sheath carbon contents between 0.005
% and 0.150 % C, which range is outside and extends substantially above that recited in
amended Claim 1. The preferred exemplary embodiments of Nagarajan, particularly
10 EXAMPLES 1-3 thereof, have substantially higher sheath carbon contents in a range between
0.015 % and 0.05 % C. Sheath carbon contents in the ranges disclosed by Nagarajan would
produce comparatively more fumes than the ultra low carbon metal-core weld wires of the
present invention.

15 Nagarajan does not disclose or suggest reducing fume generation in metal-core
weld wires by reducing the carbon content in the sheath thereof. More particularly, Nagarajan
fails to disclose or suggest a claimed carbon content range "... less than 0.005 % C ..." for any
purpose. Rather, Nagarajan is concerned with reducing the oxygen content of metal-core weld
wires by substantially reducing the core fill percentage thereof to levels at or below 12 %
and/or by using comparatively low oxygen content iron powders as a core constituent.

20 Neither Crockett nor James disclose or suggest low carbon metal-core weld
wires having sheath carbon contents at or overlapping the ranges claimed in the present
inventions, and the Examiner has not alleged otherwise.

25 Particularly, Crockett discloses a flux-cored weld wire having an aluminum
additive which reacts with a flux core composition to reduce fume generation. The chemistry
of flux core weld wires moreover is substantially different from that of the metal-core weld
wires of the present invention. Crockett nevertheless fails to disclose or suggest anything
about controlling the carbon content in the sheath to reduce fume generation in metal-core
weld wires.

James discloses a weld wire specifically formulated for pulsed electric arc welding and is relied upon by the Examiner for teaching the addition of Mn and Si to iron powder in a core composition.

5 Claim 1 and the Claims that depend therefrom are therefore believed to be allowable over Nagarajan, Crockett and James.

According to another aspect of the invention, the low fume generating metal-core weld wires of the present invention, for example those having sheath carbon contents of not more than 0.008 % C, have small amounts of carbon added to the core composition to improve the mechanical properties of the weld deposit produced thereby, including for
10 example improved toughness and impact strength.

Claim 3, dependent from Claim 1, recites "... the total weight of the metal-core weld wire comprises between approximately 0.005 % C and approximately 0.013 % C." Claim 1 limits the amount of carbon in the sheath to "... less than 0.005 % C ...", and thus the balance of the carbon is in the metal-core composition.

15 Claim 8, dependent from Claim 1, recites "... the metal-core composition comprises between approximately 0.0020 % C and approximately 0.0047 % C"

Claim 11, also dependent from Claim 1, recites "... the metal-core composition is between approximately 17 % and approximately 19 % of the total weight of the metal-core weld wire, the metal-core composition comprises between approximately 0.0025 % C and
20 approximately 0.0046 % C."

Claim 15 depends from Claim 12 and recites a range similar to that recited in Claim 11.

As noted above, Nagarajan, Crockett and James fail to disclose or suggest the carbon content ranges in the core of metal-core weld wires recited in Claims 3, 8, 11 and 15
25 in combination with a carbon content in the sheath that is "... less than 0.005 % C ..." as recited in Claim 1.

Claims 3, 8, 11 and 15 are therefore believed to be in condition for allowance.

Nagarajan, Crockett and James also fail to disclose or suggest low fume metal-core weld wires having the core composition recited in Claims 4, 8-13 and 16, and particularly the various combinations of Fe-Mn, Fe-Si, Fe-Mn-Si and Fe-Ti in the core composition, which provide the core carbon content in the ranges recited in the base or intervening claims.

5 Claims 4, 9, 10-13 and 16 are therefore believed to be in condition for allowance.

 Regarding Claims 17-20, Nagarajan, Crockett and James also fail to disclose or suggest metal-core weld wires having fume generation rates recited in said claims. The Examiner's rejection does not specifically address these limitations. Claim 17-20, which are
10 dependent from Claim 1, are therefore believed to be in condition for allowance.

 New independent Claim 21 recites a "low fume metal-core weld wire" comprising "... a low carbon steel sheath having a carbon content of not more than approximately 0.008 % C ... the metal-core composition comprises between approximately 0.0020 % C and approximately 0.0047 % C based on the total weight of the metal-core weld
15 wire."

 Nagarajan, Crockett and James fail to disclose or suggest a "low fume metal-core weld wire" having a sheath and metal-core with carbon content ranges recited in new Claim 21 and the Claims that depend therefrom.

 As noted above, Nagarajan is concerned with reducing the oxygen content of
20 metal-core weld wires by substantially reducing the core fill percentage and by using low oxygen content iron powders as a core constituent. Crockett discloses flux-cored weld wires having aluminum for reducing fume generation but fails to disclose or suggest anything about reducing fumes in metal-core weld wires by reducing the carbon content in the sheath thereof. James discloses a weld wire formulated specifically for pulsed arc welding and otherwise fails
25 to compensate for the deficiencies of Nagarajan and Crockett.

 New Claim 21 and dependent Claims 22-27 are therefore believed to be allowable over Nagarajan, Crockett and James.

MISZCZAK ET AL.
"Ultra Low Carbon Metal-Core Weld Wire"
Atty. Docket No. 8313

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Art Unit 1725

New Claim 22, dependent from Claim 21, recites "... the metal-core composition between approximately 17 % and approximately 19 % of the total weight of the metal-core weld wire, the metal-core composition comprises between approximately 0.0025 % C and approximately 0.0046 % C based on the total weight of the metal-core weld wire."


5 These ranges further distinguish over Nagarajan, Crockett and James and thus Claim 22 is believed to be in condition for allowance for these additional reasons.

Nagarajan, Crockett and James also fail to disclose or suggest low fume metal-core weld wires having the core composition recited in Claims 23, 24 and 26-27, and particularly the various combinations of Fe-Mn, Fe-Si, Fe-Mn-Si and Fe-Ti in the core
10 composition, which provide the core carbon content in the recited ranges. Claims 23-27 are therefore believed to be in condition for allowance.

In view of the amendments and discussion above, it is submitted that all pending claims of the present application are now in condition for allowance. Kindly withdraw any rejections and objections thereto and allow the claims of the present application
15 to issue as a United States Patent.

The undersigned requests a telephone interview upon the Examiner's careful review of this amendment, before preparing an Official action in response thereto.

Respectfully submitted,



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